

From: [Gray, David](#)
To: [Broyles, Ragan](#); [Webster, Susan](#); [Smith, Monica](#)
Cc: [Gray, David](#); [Assunto, Carmen](#)
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Is Anhydrous Ammonia a Risk to Your Community?

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[Public Health](#), [Environment](#), [Environmental Right to Know](#), [Health, Safety, and Environment](#), [Open, Accountable Government](#), [Government Matters](#)



Anhydrous ammonia and ammonium nitrate are the two substances that have been investigated as possible causes of the April 17 explosion of the West Fertilizer Company plant in Texas. Though experts now believe the explosion was due to the ammonium nitrate, the facility did have two 12,000-gallon tanks of anhydrous ammonia, which could have exacerbated the tragedy in Texas had they leaked or exploded.

In the past 15 years, almost 10,000 facilities [nationwide](#) have stored large amounts of anhydrous ammonia. Communities in every state are living near large quantities of a dangerous toxin, and residents may not even know it. We hope their emergency personnel do. To allow citizens to see if there are facilities with anhydrous ammonia in their communities, the Center for Effective Government created [a new interactive map tool](#).

What Is Anhydrous Ammonia?

Anhydrous ammonia is a pungent gas, most often used as a source of nitrogen fertilizer for corn, milo, and wheat. It is also commonly used as an industrial refrigerant for cold [storage](#) facilities and meat-packing plants. If heated, it can explode.

Exposure to even small amounts of anhydrous ammonia can cause serious burning of the eyes, nose, and throat. Exposure to higher levels causes coughing or choking to occur and can cause death from a swollen throat or from chemical burns to the lungs. When the eyes are exposed to concentrated gas or liquid anhydrous ammonia, serious corneal burns or blindness can occur. In general, the severity of symptoms depends on the degree of exposure.

Anhydrous Ammonia Facilities Nationwide

The Clean Air Act requires facilities handling large quantities of toxic, flammable, or otherwise reactive chemicals to submit risk management plans. For anhydrous ammonia, the reporting threshold is 10,000 pounds. In the last 15 years, almost 10,000 facilities have filed risk management plans because they are storing or producing over 10,000 pounds of anhydrous ammonia. Since anhydrous ammonia is often used as a fertilizer, it isn't surprising that the states with the highest number of facilities are located across the Corn Belt, including Iowa, Illinois, and Kansas. Iowa is the only state that has had more than 1,000 facilities storing large quantities of the chemical. (See Table 1.)

Table 1. Facilities Using Anhydrous Ammonia (1996-2011)

[click to enlarge as a PDF](#)

State	Number of Facilities	Number of Accidents	Number of Facilities with Accidents	Accident Rate	Number of Facilities with Multiple Accidents	Multiple Accident Rate	Total Number of Deaths	Total Number of Injuries	Total Number of People Evacuated Due to Accidents	Total Amount of Property Damage
States with 300 or More Facilities (11) Using Anhydrous Ammonia										
IA	1,052	75	61	5.8%	10	1.0%	2	95	1,434	\$891,726
IL	969	57	50	5.2%	5	0.5%	0	339	4,983	\$821,370
KS	803	49	22	2.7%	6	0.7%	1	165	479	\$6,524,121
CA	685	75	56	8.2%	11	1.6%	0	91	31,048	\$2,102,248
NE	684	18	15	2.2%	2	0.3%	0	21	807	\$3,402,800
TX	587	84	52	8.9%	11	1.9%	2	136	1,153	\$45,509,391
MN	500	24	23	4.6%	1	0.2%	3	105	3,024	\$88,434
IN	420	51	36	8.6%	6	1.4%	1	23	413	\$6,372,325
ND	359	15	9	2.5%	1	0.3%	0	18	320	\$34,200
MO	355	26	23	6.5%	3	0.8%	0	7	603	\$2,688,000
OH	312	30	23	7.4%	6	1.9%	0	39	151	\$2,500
States with 100-299 Facilities (13) Using Anhydrous Ammonia										
OK	246	17	11	4.5%	4	1.6%	0	12	200	\$893,600
WI	243	15	15	6.2%	0	0.0%	1	19	202	\$524,786
WA	225	11	11	4.9%	0	0.0%	0	10	327	\$0
GA	182	26	18	9.9%	4	2.2%	0	28	1,065	\$10,051,100
MI	163	15	10	6.1%	3	1.8%	0	19	102	\$696,280
PA	158	18	16	10.1%	2	1.3%	0	27	724	\$586,400
FL	156	32	23	14.7%	7	4.5%	0	59	45	\$2,001,634
CO	147	11	9	6.1%	1	0.7%	0	31	0	\$251,100
KY	135	13	10	7.4%	3	2.2%	2	28	1,150	\$12,021,412
SD	121	4	4	3.3%	0	0.0%	0	2	0	\$0
NC	113	24	20	17.7%	4	3.5%	5	133	255	\$55,104,250
TN	104	27	10	9.6%	5	4.8%	0	16	0	\$2,500
AR	100	41	21	21.0%	9	9.0%	0	45	1,210	\$289,513
States with Fewer Than 100 Facilities (26) Using Anhydrous Ammonia										
MT	98	3	3	3.1%	0	0.0%	0	0	0	\$0
AL	92	17	14	15.2%	2	2.2%	0	20	1,415	\$4,517,490
OR	92	15	13	14.1%	2	2.2%	0	31	1,651	\$673,900
NY	88	9	8	9.1%	1	1.1%	0	6	2,629	\$131,595
VA	84	11	8	9.5%	2	2.4%	0	8	498	\$140,080
LA	83	47	25	30.1%	11	13.3%	0	27	6,971	\$10,985,747
AZ	80	11	8	10.0%	2	2.5%	0	2	35	\$1,200,000
ID	73	3	3	4.1%	0	0.0%	0	2	0	\$10,500
MS	60	6	6	10.0%	0	0.0%	0	0	3	\$190,000,000
SC	57	8	7	12.3%	1	1.8%	1	25	25	\$4,400
MD	56	3	1	1.8%	1	1.8%	0	3	0	\$0
UT	43	5	4	9.3%	1	2.3%	0	8	0	\$54,134
MA	40	5	5	12.5%	0	0.0%	0	2	45	\$141,562
AK	30	7	5	16.7%	2	6.7%	0	8	0	\$1,030,103
NJ	26	4	4	15.4%	0	0.0%	0	5	0	\$0
NM	25	4	4	16.0%	0	0.0%	0	8	0	\$1,000
WV	24	9	4	16.7%	2	8.3%	0	9	100	\$100
WY	19	1	1	5.3%	0	0.0%	0	2	0	\$0
DE	17	7	3	17.6%	1	5.9%	1	16	0	\$500
ME	17	0	0	0.0%	0	0.0%	0	0	0	\$0
NV	16	3	1	6.3%	1	6.3%	0	0	0	\$0
CT	13	0	0	0.0%	0	0.0%	0	0	0	\$0
NH	10	2	2	20.0%	0	0.0%	0	1	9	\$240,000
RI	8	0	0	0.0%	0	0.0%	0	0	0	\$0
HI	7	1	1	14.3%	0	0.0%	0	0	600	\$0
VT	5	0	0	0.0%	0	0.0%	0	0	0	\$0
Totals	9,982	939	678	6.8%	133	1.3%	19	1,651	63,676	\$359,990,801

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Currently, almost 8,000 facilities report storing large quantities of anhydrous ammonia. About 2,000 facilities have "deregistered" and no longer submit risk management plans to the U.S. Environmental Protection Agency (EPA). Deregistration does not necessarily mean that a facility no longer stores the chemical. It may just be that the quantity produced or stored has fallen below 10,000 pounds. Deregistration could also mean that the facility switched to a safer alternative, or the facility may have closed down entirely.

Questionable Safety Record

Over the past 15 years, almost 1,000 accidents have occurred at 678 of the facilities storing large quantities of anhydrous ammonia, and 133 of those facilities had multiple accidents. In other words, 6.8 percent of the facilities storing anhydrous ammonia had an accident in the past 15 years, and over a fifth of these had multiple accidents. These accidents resulted in 19 deaths, 1,651 injuries, and almost \$350 million in property damage. Moreover, 63,676 people in the facilities and surrounding communities had to be evacuated when accidents occurred. Although not all the accidents at these facilities were the result of anhydrous ammonia releases, many were.

Though accidents at facilities using anhydrous ammonia as a refrigerant do not usually involve fires or explosions, they can result in dangerous releases of toxins. Last month, Tyson Foods, Inc. [agreed to pay \\$4 million in civil penalties](#) to settle charges from eight releases of anhydrous ammonia in Iowa, Kansas, Missouri, and Nebraska that resulted in multiple injuries and one death.

Iowa has the largest number of facilities storing anhydrous ammonia (1,052) and a good safety record. Only 61 of these facilities experienced any accidents in the past 15 years, leaving its accident rate (5.8 percent) below the national average. Nonetheless, the Iowa accidents resulted in two deaths, 95 injuries, and almost 1,500 people evacuated over the past 15 years.

Among the eleven states with more than 300 anhydrous ammonia facilities, Texas had the largest number of accidents (84) and the highest accident rate (8.9 percent). Two people died, 136 were injured, and 1,153 were evacuated. Moreover, the most financially costly reported accident involving anhydrous ammonia in Texas over this period occurred at Bayer Material Science in Baytown, TX.

In September 2006, 39 workers at the facility were injured at the site when a process vessel containing toluene diisocyanate, a toxic chemical used to make household products and foam furniture cushions, exploded, [releasing](#) carcinogenic chemicals and anhydrous ammonia. The workers were treated for burns and eye, nose, and throat irritations, and the plant was closed down for three months.

The following year, workers injured in the explosion filed a class action lawsuit against the company, alleging that the explosion occurred as a result of unsafe workplace practices. Workers claimed that plant officials were having problems with the toluene diisocyanate unit before the explosion but failed to warn contractors. The claims were settled in 2008, but the amount of the settlement has not been made public.

The accident rate at California facilities was slightly higher than the national rate at 8.2 percent. The 75 accidents that occurred at 56 of California's 685 facilities over the past 15 years did not result in any deaths, but they did lead to over 30,000 people being evacuated and 91 injuries. The high evacuation rate in California appears to be related to population density around the facilities that use or produce anhydrous ammonia. For example, an August 2009 [incident](#) at Columbus Manufacturing, a meat processing facility located in South San Francisco, released approximately 200 pounds of anhydrous ammonia into the air from a leak in a rooftop cooling system. The release resulted in the evacuation of all facility employees and several neighboring businesses. Nearly 30 people from a nearby corporate campus sought medical attention, and 17 individuals were hospitalized. In addition, several local streets and highway off-ramps were shut down.

The damage from the release would have been much worse had it not occurred around 5.30 a.m. – before more people arrived for work and dropped their children off at three nearby daycare facilities, [said](#) Jared Blumenfeld, EPA's regional administrator in San Francisco. The leak was also the second one in 2009 for the meat-packing facility (there was a prior leak in February of that year). The meat processing company agreed to pay nearly a \$700,000 penalty to the EPA and spend about \$6 million on a new refrigeration unit. The company will also improve its alarm and ammonia release notification procedures.

Although not among the states with the highest number of anhydrous ammonia facilities, Louisiana and Arkansas have the highest accident rates, 30 and 21 percent, respectively. Louisiana has only 83 facilities that have stored anhydrous ammonia, but 25 of those facilities (30.1 percent) have had accidents and 11 facilities (13.3 percent) have had multiple accidents. These accidents have not resulted in any deaths but have caused 27 injuries, 6,971 evacuated, and just shy of \$11 million in property damage.

The single most expensive accident at an anhydrous ammonia facility in Louisiana occurred at Mosaic Fertilizer's Faustina Plant in St. James. On Oct. 11, 2006, a process vessel failed, resulting in an explosion and fire that caused an estimated \$3.5 million in damages. The vessel contained 16,450 pounds of process gas, including 2,405 pounds of ammonia.

Out of 100 Arkansas facilities that have used anhydrous ammonia, 21 had accidents and nine had more than one. No deaths occurred from these accidents, but 45 injuries did. These facilities, including Tyson Foods, Simmons Foods, and Zero Mountain Inc., mainly use anhydrous ammonia as a refrigerant for cold storage and meat packing. Following the West, TX explosion, the Arkansas Department of Emergency Management [stated](#) that anhydrous ammonia is not primarily used in Arkansas as a fertilizer but is mostly used as a refrigerant in the state. The Arkansas Department of Agriculture said that only one plant (out of 180 facilities that store fertilizer) has both anhydrous ammonia and ammonium nitrate (similar to the West Fertilizer Company plant) on site. The facility, El Dorado Chemical Co. in El Dorado, AR uses anhydrous ammonia to produce ammonium nitrate.

Property Damage

In the last 15 years, Mississippi had the highest amount of property damage (\$190 million) associated with accidents at anhydrous ammonia facilities, but it was almost entirely the result of a single accident. In August 2007, a fire broke out in Chevron's largest U.S. oil refinery, located in Pascagoula, MS. Although extinguished two hours later, the fire burned near the main part of the refinery, and 200-foot flames were visible for miles. Chevron [reportedly](#) offered free car washes to dislodge the black soot that fell on nearby cars as a result of the fire. The refinery's risk management plan report noted that although the fire did not initially involve any chemicals required to be reported under its risk management plan, as the fire progressed, more toxic chemicals became involved.

It is important to note that the property damage estimates recorded in the accident reports sent to the EPA only include damage to the facility's property. These estimates do not include additional costs to the community that resulted from the incident – such as medical costs for treating the injured or costs for emergency first responders, police, and any loss to other property or businesses. All of the damages reported in Table 1 are estimates of private damages to the companies, not the costs to the public.

Transportation Accidents

Anhydrous ammonia-related emergencies also occur during transportation accidents, such as train derailments or highway incidents involving tanker trucks. These accidents can release large quantities of anhydrous ammonia, sometimes forcing the evacuation of entire sections of a city or town. According to data from the Emergency Response Notification System, a database of reported spills, releases, and incidents involving chemicals and oil, there were [870 reported incidents involving anhydrous ammonia in 2012](#). The majority of the incidents (662) were at fixed sites, but there were also 37 vehicle, 10 boat, nine pipeline, and seven railroad incidents.

One of the most well-known transportation accidents involving anhydrous ammonia occurred in January 2002, when a freight train [derailed](#) and 31 of its 112 cars careened off the tracks just outside of Minot, ND. Five tanker cars carrying anhydrous ammonia ruptured, and a plume covered the site and surrounding area. As a result of the accident, one resident died, 11 people sustained serious injuries, and 322 people, including the train's conductor and engineer, suffered minor injuries.

Six months earlier, in June 2001, a [tanker spill](#) at the Harvest Land Co-op near West Milton, OH created a "two-mile plume of anhydrous ammonia" in Ludlow Creek, which feeds the Stillwater River. The state's Environmental Protection Agency closed the West Milton water plant to protect the water in the village's emergency towers. The chemical discharge killed more than 103,300 fish, according to the Ohio Division of Wildlife.

Better Regulation of Dangerous Chemicals Critical

Anhydrous ammonia is just one of many dangerous but common chemicals that are used in various industrial processes and can pose a risk to communities and emergency personnel. Community groups, local officials, and public interest organizations have been pushing companies to replace dangerous substances with safer chemicals for decades. The EPA does not have sufficient authority under the outdated Toxic Substances Control Act (TSCA) of 1976 to effectively regulate these chemicals.

On April 10, Sen. Frank Lautenberg (D-NJ), who has been working on TSCA reform since 2005, [reintroduced the Safe Chemicals Act](#), which would increase chemical safety, improve consumer access to information on chemical hazards in products, and protect vulnerable populations, such as low-income communities, children, and pregnant women.

Some communities have heeded the call for safer alternatives. In 2009, the Clorox Company announced its replacement of bulk quantities of chlorine gas with safer chemicals. Reportedly, 220 facilities, including water treatment facilities, power plants, and fertilizer companies, have switched to safer and more secure chemicals and processes since 2001, but this represents a minuscule number of the plants that report high volumes of risky chemicals on site.

Environmental activists believe the EPA could do more to push safer alternatives. The [National Environmental Justice Advisory Council](#) argues that EPA could use its authority under Section 112(r) of the Clean Air Act to require plants to shift to less toxic chemical alternatives.

State governments can also do more. After the Oklahoma City bombing in 1995, several states essentially regulated out of existence the use of ammonium nitrate as a fertilizer. In Michigan, [ammonium nitrate](#) (which was once commonly used in farming in the state) is "virtually nonexistent" thanks to a movement to encourage farmers to use safer alternative chemicals.

If they choose to do so, both state and federal agencies can reduce the risks that a disaster like West, TX will occur in the future. Let's hope they do so – before more lives are lost.

<http://www.foreffectivegov.org/is-anhydrous-ammonia-a-risk-to-your-community>